DEVICE TITLE
Device 2F227-1, AH-1Z FLIGHT TRAINING DEVICE (FTD).

1. GENERAL DESCRIPTION.
NOTE: Trainer descriptions are provided for reference purposes only and may not reflect the actual trainer configuration. This device is located in building number 4041. The AH-1Z FTD, Device 2F227 provides replication of crew stations of the AH-1Z aircraft in an interactive, real-time simulation environment for crew and individual aircrew systems training. The FTD system elements are comprised of both actual and simulated aircraft equipment, operating with a visual image generator (IG) and a collimated visual display system (VDS), and utilize a high fidelity set of airframe and avionics models. The AH-1Z 2F227 was designed for an availability of operation (Ao) rating of greater that 98% training time. The FTD focus is the training requirements of the Fleet Readiness Squadron (FRS) aviator.

The FTD interfaces with other simulators via the U.S. Marine Corps (USMC) supplied Tactical Environmental Network (TEn), through the Aviation Distributed Virtual Training Environment (ADVTE) system. The FTD facilitates training in procedures, tactics, and threat evaluation per the AH-1Z platform Training and Readiness Manual (TRM). Training tasks include, but are not limited to, day/night shipboard and field takeoffs and landings, aerial refueling, instrument flight procedures, departure procedures, spin procedures, radar system navigation, formation flying, combat maneuvering, weapons delivery and night vision goggle (NVG) training. The FTD provides a means for evaluating tactical procedures and maneuvers against specific threat environments. Aircrew skill training includes all systems modes of operation and proficiency in the use of controls and displays required by the mission objectives. The FTD is interoperable, through the USMC supplied TEn, to support training in the full mission spectrum from planning through debrief.

2. FUNCTIONAL DESCRIPTION.

2.1 TRAINEE STATION. The 2F227 cockpit is a full-scale replica of the AH-1Z aircraft. Direction and movement of controls and switches are identical to those of the aircraft and simulate all cockpit instrument indications automatically in response to control movement by a crewmember, simulated aircraft performance, instructor-inserted actions, or external simulated environmental effects, such as turbulence or wind shear. All displays, instruments, panel assemblies, switches, levers, knobs, and lights of the trainee station are provided to replicate the form, fit, function, feel, and finish of the aircraft, replicate both the static and dynamic responses of the design basis aircraft. The stimulated avionics systems are Aircraft Common Operational Equipment (ACOE) and function as in the actual aircraft. The simulated cockpit equipment is designed to appear and function as its aircraft counterparts. The device is compatible with night vision devices (NVDs).

2.1.1 INTERCOM SYSTEM. There is an intercom system provided for communication between the following positions: Pilot; Co-pilot; Instructor; Observer(s); and Debrief Room.

The aircrew interfaces to the intercom system through the aircraft Intercommunication System (ICS) panels and switches using standard issue headgear, making the use of the intercom transparent.

2.1.2 AUDIO SYSTEM. The audio system consists of an ASTi® system interfaced to the host computer. The audio system supports switching, mixing and volume control for the trainees and IOS operators, and provides feedback to trainees and trainers regarding simulation events such as normal aircraft operational noises, missile launch, crash, malfunctions, etc. The network supports audio data transfers to/from the computational system as part of the Ownship Network.

2.2 INTRUCTOR/OPERATOR STATION (I/OS). The I/OS is located behind the crew station area. The I/OS station can be easily accessed either behind the aft pilot seat location of at each pilot Multi-function Display (MFD). The instructor/operator seat provides adequate vision to the instrument panel and visual system. The I/OS instructor/operator shall be able to observe the activities of both aircrew students while positioned in their movable seats. The I/OS is a commercial off-the-shelf (COTS) product that has been tailored for the AH-1Z military application.

The I/OS is operated primarily using touchscreen displays and simulator control panels. It has one upper 20-inch repeater display, 15-inch upper touchscreen display, lower 20-inch touchscreen display 15-inch forward lower touchscreen display and keyboard, mouse and trackball jack panel. The I/OS 20-inch Repeater Display (left) displays up to six (6) video windows, which repeat nine (9)selected cockpit displays as set up on the I/OS. The right I/OS 20-inch Touchscreen Display interfaces with I/OS central processing unit (CPU) Assembly #1 and I/OS CPU Assembly #2. The upper 15-inch Touchscreen Display interfaces with I/OS CPU Assembly #2, and the lower 15-inch Touchscreen Display interfaces with I/OS CPU Assembly #3.

2.2.1 INSTRUCTOR CONTROLS. Instructor/operator controls enable control of all required system variables and insertion of abnormal and emergency conditions into the simulated aircraft systems. The I/OS contains all relevant control features necessary to accomplish simulator training specified in the AH1Z TRM. The I/OS control panels include: control loading motion, I/OS lighting, misc./resets/freezes, instructor microphone, communication system, audio, keyboard, mouse and trackball and maintenance interphone. The instructor position need not be occupied for operation of the trainer.

2.3 CONTROL STATION (e.g., Operator). N/A

2.4 COMPUTER SYSTEM(S) and PERIPHERALS. Computational Systems include: Processing and Control, Support, Aircraft, Sensor Channels and Tactical. The Computer Area contains all computer systems and hardware required to simulate the audio, input/output systems and visual cueing sensed during simulated flight.

2.4.1 INPUT-OUTPUT SYSTEM. The Input-Output system consists of a Vector Electronics and Technology® (VME) chassis containing 64-bit high voltage Discrete Input cards, 64-bit high voltage Discrete Output cards, 64-channel latching Analog Input cards, 64-channel Analog Output cards, 64-channel Relay Card and 2-channel synchro cards. The system contains approximately 10% spare capacity for future expansion.

2.5 SHARED MEMORY. N/A

2.6 AIRCRAFT COMMON SUBSYSTEMS. N/A

2.7 POWER CONTROL SYSTEM (PCS).
The PCS controls distributes alternating current (AC) and direct current (DC) power to the 2F22& FTD. An Uninterruptible Power Quality (UPQ) receives and monitors facility power and contains the circuitry to accomplish an orderly start-up and shutdown of simulator power. The PCS control panel on the UPQ provides visual indication of power faults, temperature limits and electrical loading and operational faults for the distribution and supply of facility power to the simulator. The UPQ distributes and monitors AC power throughout the simulator to junction boxes, Remote Power Controllers (RPCs), consoles and equipment cabinets, DC power supplies and Personal Computer (PC) related components.

2.8 CONTROL LOADING SYSTEM. Flight Safety® control loading replicates all the mechanical linkages, sensors, signal conditioning, computational resources, and software required to duplicate the form, fit, function, feel, and finish of the AH-1Z aircraft force feel system as perceived by the pilot. The end-to-end system response is the same as the aircraft. The control loading system utilizes a COTS hardware system with software tuned to the AH-1Z FTD specification requirements, which consists of four (4) force loader units, a control loading PC with automated control force measuring system software installed, and is interfaced to the host computer. The control force system duplicates the force feel and mechanical characteristics of the aircraft force feel system in all modes of ground and flight operations, for both normal and emergency conditions.

2.9 VISUAL/VIDEO SYSTEM(S). The visual system consists of a dome around the flight deck and projectors mounted on the top of the simulator that displays images inside the dome. The VITAL 1100™ Image Generator (IG) and the visual system provides high fidelity images for viewing by the aircrew with a Field of View (FOV) adequate to train all tasks and supports training events for both helicopter and fixed-wing operations. The IG provides the simulated Out-the-Window (OTW) visual imagery projected by seven (7) channels Liquid Crystal On silicon (LCOS) projectors onto a 270-degrees (270^0) wrap-around full dome. This system provides simulator training in an environment using NVDs, OTW viewing, Forward-looking Infrared (FLIR), Target Sight System (TSS) and CTV imagery, height above terrain, and collision detection.

2.9.1 PROJECTOR SYSTEM. The Rockwell Collins 2015HC Portrait Projector is the Zorro® series of LCOS projectors. The 2015HC combines QXGA (2048 x 1536 pixel) image resolution with high contrast ratio and Rockwell Collins' patented 4th-panel 'black video' technology. Its on-board Mercator IV module and built-in Cobra software provide full integrated pixel, color and geometry management. LCOS based optics use a grid of liquid crystal pixels mounted on a reflective surface to reflect and modulate light. Typical LCOS projectors use one (1) panel each for red, green and blue (RGB) color transmission; however, the Zorro™ range of projectors add the Rockwell Collins-patented 4th (black) panel to dramatically increase contrast and black levels.

2.9.2 Tactical Environmental Network (TEn). The USMC TEn allows for a diversified and complex gaming environment for such role-playing scenarios as

ground artillery, naval gunfire, air-to-air attack, etc. The user interfaces through the Tactical Operators Station (TOS), where human pilots training/gaming are controlled. The TEn allows data transfers to/from the computational system as part of the High Level Architecture (HLA) Network, and is capable of receiving/sending HLA data from the HLA Wide Area Network (WAN). The TEn is the central interface between the AH-1Z FTD and other trainers. The hardware components of the TEn consist of a computer, host interface cards, TOS interface, LCD display, keyboard and mouse.

2.11 AIR CONDITIONING SYSTEM/ENVIRONMENTAL SYSTEM(S). A separate split unit air conditioning system provides three (3) metric tons of air conditioning with a 1200-cubic feet per minute (CFM) flow to the rear of the FTD. This conditioned air is ducted through the simulator cooling system to all parts of the FTD. This air cools the on-board equipment racks, crew stations, instructor areas, and visual display system. Air for this system is drawn in from the FTD bay and exhausts into the bay after cooling the FTD. The air handler for this system, designated FC-1, is mounted nine (9) feet in the air on a uni-strut rack that is anchored to the walls and floor of the building. This allows the supply duct and the condensation drains to be routed without causing trip hazards in the bay area.

2.11.1 HIGH-BAY HEATING. A wall-mounted electric heater is provided to maintain a minimum temperature in the high bay when the electronic equipment is not operating. This heater is fed from Panel B circuits 17 and 19 through the buck/boost transformer providing 240 volts for operation. The heater has an integral thermostat control.

2.12 MOTOR GENERATOR SET(S) (e.g., inverters). N/A

2.13 HYDRAULIC/PNEUMATIC SYSTEM(S). N/A

3. ILLUSTRATIONS. For system/subsystem drawings and documentation, refer to Operational and Maintenance Manuals located at each site. For trainer layout, see Figure 1 below.

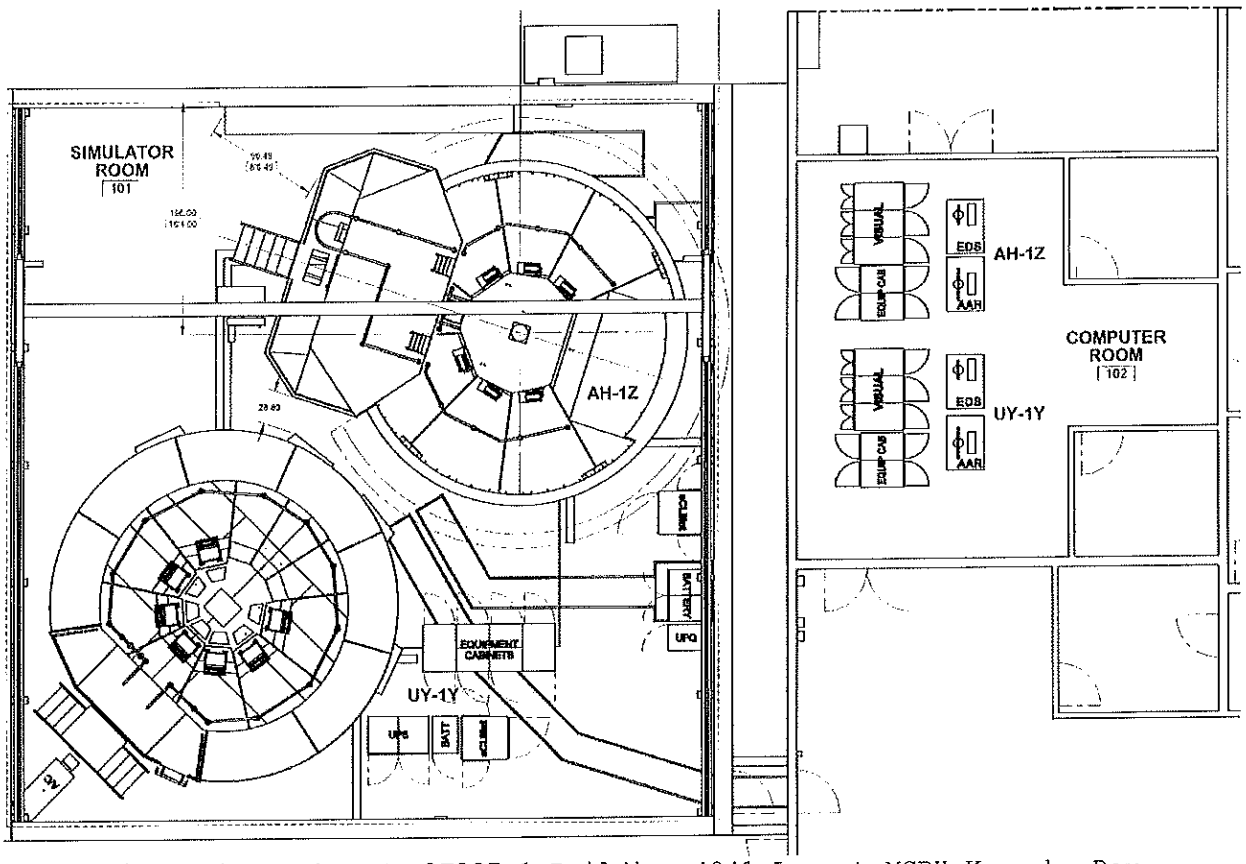

Figure 1: AH-1Z FTD 2F227-1 Building 4041 Layout MCBH Kaneohe Bay

4. GOVERNMENT PROVIDED AIRCRAFT COMMON EQUIPMENT (ACE)/TRAINER UNIQUE EQUIPMENT.

4.1 AIRCRAFT COMMON EQUIPMENT (ACE). The Government is responsible for Intermediate and Depot level maintenance for the ACE below:

PART NUMBER	NOMENCLATURE	QTY
92004050	Mission Grip	2
V-80AB-F	Video Tape Recorder (VTR)	1
3033230-104	Digital Map Computer (DMC)	1
173793-01-03	Advanced Memory Unit (AMU)	1
4685-3621	Mission Computer (MC)	2
822-0975-003	Dual Function Display (DFD)	1
822-1433-002	Keyboard	2
449-001-311-101	Cyclic Grip	2
449-350-001-103	Collective Panel Assembly	2

Table 4-1 2F227 FTD Aircraft Common Equipment (ACE)

Refer to the ALSP for disposition instructions.

4.2 TRAINER PECULIAR EQUIPMENT.

5. GOVERNMENT FURNISHED PROPERTY (GFP) INVENTORY. The formal GFP inventory shall be all items identified (i.e. tools/support equipment, spare parts, technical data support package, and software support material, etc.) during the mobilization period and recorded in the yearly Inventory/Utilization Data Report. The Contractor shall comply with the development, maintenance and submission requirements for this report as stated in the applicable CDRL reports.